

Cooper Lighting Solutions Photometric Lab
1121 Highway 74 South
Peachtree City, GA 30269



Scaled data based on original data using
LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-State
Lighting Products

Test Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

Brand: METALUX

Report Number: P827729

Luminaire Tested: **OHBL-24HE-A-UNV-L930-CD-UPL36**

Issue Date: 5/3/2024



Test Information

Test Method: LM-79-08
Report Number: P827729
REPORT IS A COMBINATION OF REPORTS P826299 AND G3-2310-221-2
Test Lab: INNOVATION CENTER
Issue Date: 5/3/2024
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)
Product Line: METALUX
Catalog Number: OHBL-24HE-A-UNV-L930-CD-UPL36
Description:
Light Source: -
Ballast/Driver: -

Summary

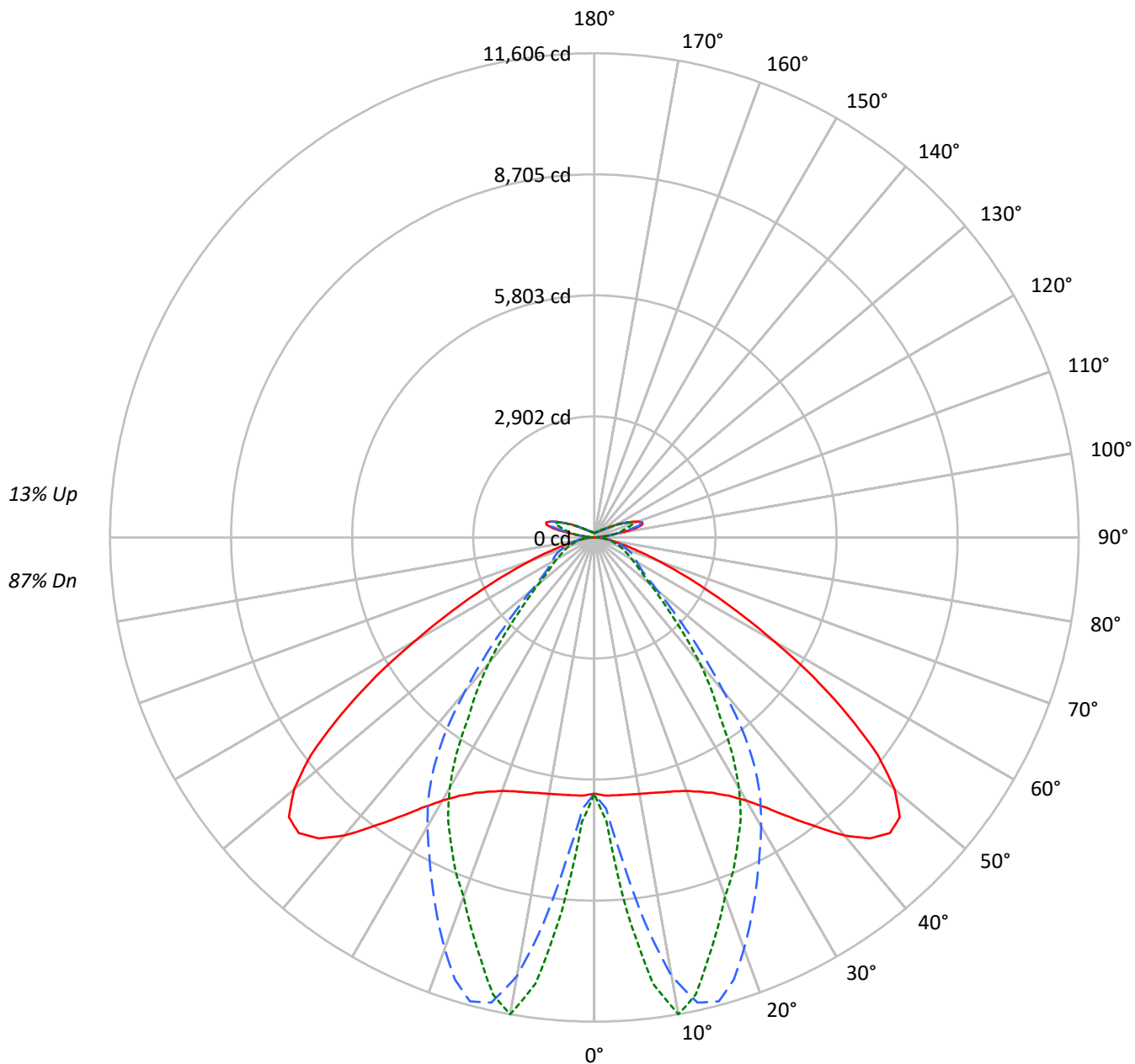
Lumens per Lamp: N/A
Luminaire Lumens: 22603.5 lumens
Efficiency: N/A
Efficacy: 139.7 lumens/watt
Spacing Criteria (0/90/45): 2.18 / 1.37 / 1.3
Luminous Opening: Rectangular w/ Sides (W: 3.78' x L: 1.8' x H: 0.17')
CIE Type: Semi-Direct

Input Watts (W): 161.8
Input Voltage (V): NR
Input Current (Ain): NR
Voltage Rise (V): NR
Power Factor: NR
Total Harmonic Distortion (THDi): NR
Frequency (hertz): 60
Stabilization Time: NR
Operation Time: NR
Ambient Temperature (°C): NR
Test Distance: 25 FT

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CATALOG NUMBER: OHBL-24HE-A-UNV-L930-CD-UPL36

Luminous Intensity Polar Plot





TEST NUMBER: P827729

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COEFFICIENT OF UTILIZATION - ZONAL CAVITY METHOD:

RF	20				20					20					20					20
RC	80				70					50					30					10
RW	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10
RCR																				
0	116	116	116	116	112	112	112	112	104	104	104	97	97	97	90	90	90	87		
1	108	104	100	97	104	100	97	94	94	91	89	88	86	84	82	81	79	76		
2	99	92	87	82	96	89	84	80	84	80	76	79	76	73	74	72	69	67		
3	92	83	76	70	88	80	74	69	76	70	66	71	67	63	67	64	61	58		
4	85	75	67	61	82	72	66	60	68	63	58	65	60	56	61	57	54	52		
5	79	68	60	54	76	66	58	53	62	56	51	59	54	50	56	52	48	46		
6	73	61	54	48	71	60	53	47	57	51	46	54	49	45	52	47	43	41		
7	68	56	48	43	66	55	48	42	52	46	41	50	44	40	48	43	39	37		
8	64	52	44	39	62	50	43	38	48	42	37	46	40	36	44	39	35	34		
9	60	48	40	35	58	47	40	35	45	38	34	43	37	33	41	36	32	31		
10	56	44	37	32	54	43	36	32	41	35	31	40	34	30	38	33	30	28		

AVERAGE LUMINANCE (cd/sqm):

	0°	45°	90°
0°	9713	9713	9713
5°	9769	12221	14238
10°	9862	16857	18494
15°	10103	18372	16974
20°	10528	17055	15169
25°	11304	15345	13875
30°	12614	13825	12338
35°	14841	12107	9832
40°	17861	9226	7825
45°	20509	6290	5569
50°	20816	4318	4119
55°	18043	3402	3365
60°	13501	3186	3028
65°	9274	3202	2868
70°	5947	3095	2777
75°	3591	2873	2657
80°	2128	2536	2742
85°	1037	2197	2542



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ZONAL LUMENS:

Zone	Lumens	% Fixture
0°-10°	801.8	3.5
10°-20°	2829.9	12.5
20°-30°	4170.0	18.4
30°-40°	4382.0	19.4
40°-50°	3353.0	14.8
50°-60°	2024.7	9.0
60°-70°	1235.5	5.5
70°-80°	674.4	3.0
80°-90°	242.9	1.1
90°-100°	222.4	1.0
100°-110°	1007.3	4.5
110°-120°	833.6	3.7
120°-130°	394.6	1.7
130°-140°	199.8	0.9
140°-150°	116.8	0.5
150°-160°	68.5	0.3
160°-170°	35.6	0.2
170°-180°	10.9	0.0
0°-30°	7801.6	34.5
0°-40°	12183.6	53.9
0°-60°	17561.4	77.7
0°-90°	19714.2	87.2
90°-120°	2063.3	9.1
90°-150°	2774.4	12.3
90°-180°	2889.0	12.8
0°-180°	22603.5	100.0

CANDELA DISTRIBUTION:

	0°	22.5°	45°	67.5°	90°	Flux
0°	6142	6142	6142	6142	6142	
5°	6203	6655	7764	8669	9003	593
15°	6324	9850	11512	10742	10490	1798
25°	6758	11432	9190	8321	8115	3158
35°	8186	9155	6695	5576	5250	5193
45°	10019	5224	3084	2714	2600	7570
55°	7409	1771	1404	1301	1297	6547
65°	2970	1121	1033	884	839	3044
75°	791	697	640	528	506	910
85°	118	216	255	232	211	145
90°	6	40	51	58	59	11
95°	50	100	133	170	183	187
105°	1194	1192	1120	833	753	1135
115°	833	821	828	833	825	842
125°	410	424	434	427	419	386
135°	242	248	255	257	258	192
145°	176	180	184	187	188	112
155°	142	145	147	149	149	67
165°	122	124	124	125	126	35
175°	112	112	112	112	113	11
180°	110	110	110	110	110	



TEST NUMBER: P827729

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CANDELA DISTRIBUTION (FULL):

	0°	22.5°	45°	67.5°	90°
0°	6141.6	6141.6	6141.6	6141.6	6141.6
2.5°	6191.8	6255.0	6504.2	6762.8	6825.7
5°	6203.2	6655.1	7763.6	8668.7	9003.2
7.5°	6216.3	7303.2	9324.0	10432.2	10787.0
10°	6241.4	8122.8	10676.1	11471.7	11605.7
12.5°	6272.4	8991.1	11420.1	11391.1	11222.0
15°	6324.1	9849.9	11511.7	10742.2	10489.6
17.5°	6378.3	10576.5	11111.9	10035.9	9815.9
20°	6466.5	11115.9	10490.1	9407.9	9158.1
22.5°	6593.7	11412.5	9838.1	8840.2	8677.1
25°	6757.8	11431.6	9190.4	8320.6	8115.2
27.5°	6977.7	11166.4	8569.7	7811.5	7594.5
30°	7276.9	10658.7	7993.0	7197.6	6928.5
32.5°	7683.2	9927.9	7398.3	6456.5	6154.7
35°	8185.7	9154.6	6695.4	5575.9	5249.8
37.5°	8734.0	8296.1	5842.4	4796.0	4606.1
40°	9324.0	7411.4	4831.3	4066.2	3930.4
42.5°	9784.3	6449.7	3892.2	3379.2	3234.5
45°	10019.0	5223.8	3084.2	2713.9	2599.9
47.5°	9927.6	4054.9	2445.0	2156.4	2122.1
50°	9394.3	2994.1	1957.3	1776.4	1762.2
52.5°	8560.5	2231.7	1616.7	1504.9	1480.4
55°	7409.3	1771.4	1404.0	1301.3	1297.3
57.5°	6220.8	1504.9	1274.4	1194.9	1167.2
60°	4953.0	1341.8	1176.1	1086.3	1030.3
62.5°	3882.4	1227.8	1104.0	982.0	929.7
65°	2970.5	1121.4	1032.9	883.8	838.8
67.5°	2214.3	1020.0	946.0	780.6	754.3
70°	1613.4	916.0	847.0	694.2	673.4
72.5°	1149.9	812.2	748.0	613.1	590.2
75°	790.9	697.3	639.7	527.8	506.4
77.5°	533.6	580.1	533.0	450.6	441.7
80°	356.3	460.1	431.1	381.9	376.4
82.5°	216.2	333.9	340.2	310.5	295.5
85°	117.7	216.2	254.9	232.3	210.7
87.5°	46.1	119.8	175.7	157.8	148.6
90°	6.5	39.6	50.9	58.2	59.0
92.5°	20.2	48.5	62.2	77.6	82.4
95°	50.1	100.2	133.4	169.8	182.7
97.5°	302.3	325.0	282.1	337.1	356.5
100°	649.1	666.1	516.5	520.6	536.7
102.5°	1016.9	1030.6	814.8	674.2	649.9
105°	1193.9	1191.5	1120.4	833.4	752.6



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CANDELA DISTRIBUTION (continued):

	0°	22.5°	45°	67.5°	90°
112.5°	978.1	980.5	971.6	968.4	942.5
115°	832.6	821.3	827.7	833.4	825.3
117.5°	712.1	704.1	710.5	707.3	698.4
120°	599.0	599.0	607.1	595.7	589.3
122.5°	496.3	507.6	513.3	505.2	494.7
125°	409.8	424.4	434.1	426.8	418.7
127.5°	351.6	356.5	367.8	363.8	363.8
130°	302.3	308.8	317.7	319.3	317.7
132.5°	268.4	274.8	282.9	285.3	287.8
135°	242.5	248.2	254.6	257.0	257.9
137.5°	221.5	226.3	231.2	235.2	236.0
140°	203.7	208.6	213.4	216.6	216.6
142.5°	189.2	194.0	198.0	200.5	200.5
145°	176.2	180.3	184.3	186.7	187.5
147.5°	166.5	169.8	173.8	174.6	175.4
150°	157.6	160.0	163.3	164.9	165.7
152.5°	149.5	152.0	155.2	156.0	156.8
155°	142.3	144.7	147.1	148.7	148.7
157.5°	135.8	138.2	140.6	141.5	141.5
160°	131.0	132.6	135.0	135.0	135.8
162.5°	126.1	127.7	129.3	130.1	131.0
165°	122.1	123.7	124.5	125.3	126.1
167.5°	118.8	119.6	120.4	121.2	121.2
170°	115.6	116.4	117.2	117.2	118.0
172.5°	113.2	114.0	114.8	114.8	114.8
175°	111.6	111.6	112.4	112.4	113.2
177.5°	109.9	110.7	110.7	110.7	111.6
180°	109.9	109.9	109.9	109.9	109.9



Report Generated By 670246072 / DESKTOP-50001EG





— 0°-180° - - 45°-225° - - - 90°-270°







107.5°	1205.2	1207.6	1178.6	1037.9	897.2
110°	1112.3	1122.8	1104.2	1058.1	994.2



LM-79-2019: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

METALUX

Report Number: SP1-2304-001-2

Test Date: 05/31/2023

Luminaire Tested: OHB-15SE-N-UNV-L930

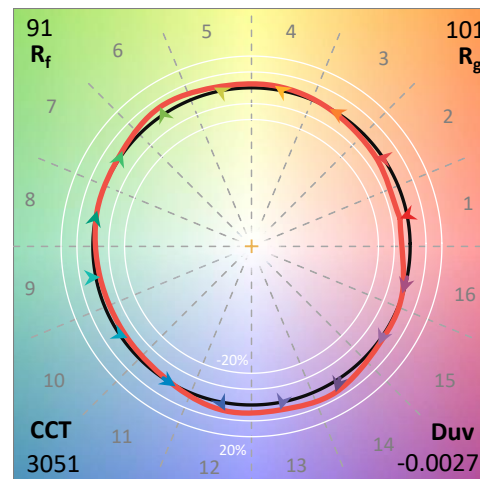
Data in this report applies to families of products including OHB-15SE-N-UNV-L930.

Test Information

Test Method: LM-79-2019
 Report Number: SP1-2304-001-2
 Test Lab: COOPER LIGHTING SOLUTIONS
 Photometer: SP1 - 76IN SPHERE
 Measurement Geometry: 4π
 Issue Date: 05/31/2023
 Manufacturer: COOPER LIGHTING SOLUTIONS
 Product Line: METALUX
 Catalog Number: **OHB-15SE-N-UNV-L930**
 Description: 15SE OHB WITH APT LEDS, NARROW LENS, 90CRI 3000K

Spectral Parameters

CCT (K):	3051	CRI (Ra):	92.2		
CIE u':	0.2497	R1:	92.8	R9:	60.2
CIE v':	0.5166	R2:	95.6	R10:	88.6
Duv:	-0.0027	R3:	96.4	R11:	92.7
CIE x:	0.4295	R4:	92.2	R12:	82.3
CIE y:	0.3950	R5:	92.5	R13:	93.6
CIE z:	0.1755	R6:	94.0	R14:	97.4
Peak Wavelength (nm):	621	R7:	91.7		
Dominant Wavelength (nm):	583	R8:	82.4		
Purity:	47.8				
Rf:	90.7				
Rg:	101.5				



Test Conditions

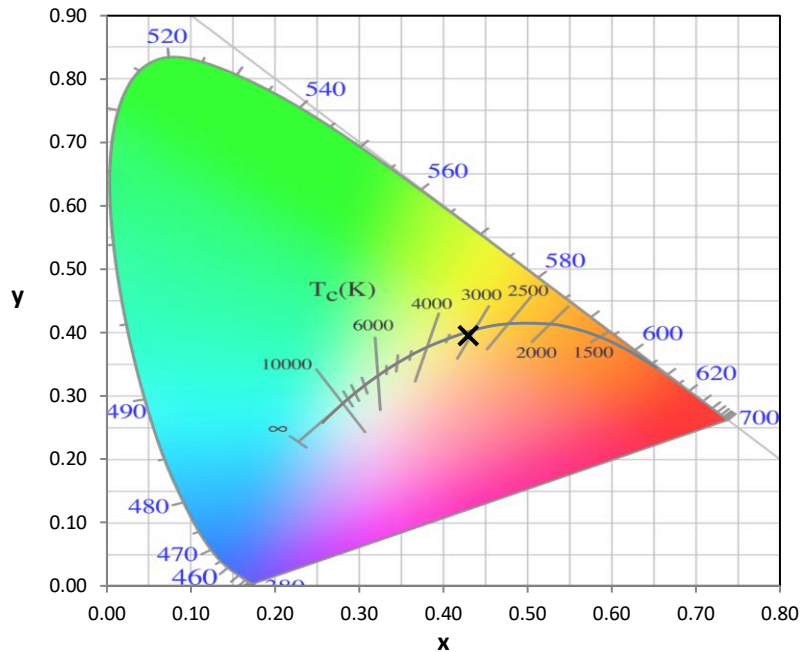
Stabilization Time: 22M
 Operation Time: 12H
 Room Temperature (°C) / RH%: 25.2/44%
 Sphere Temperature (°C): 25.3

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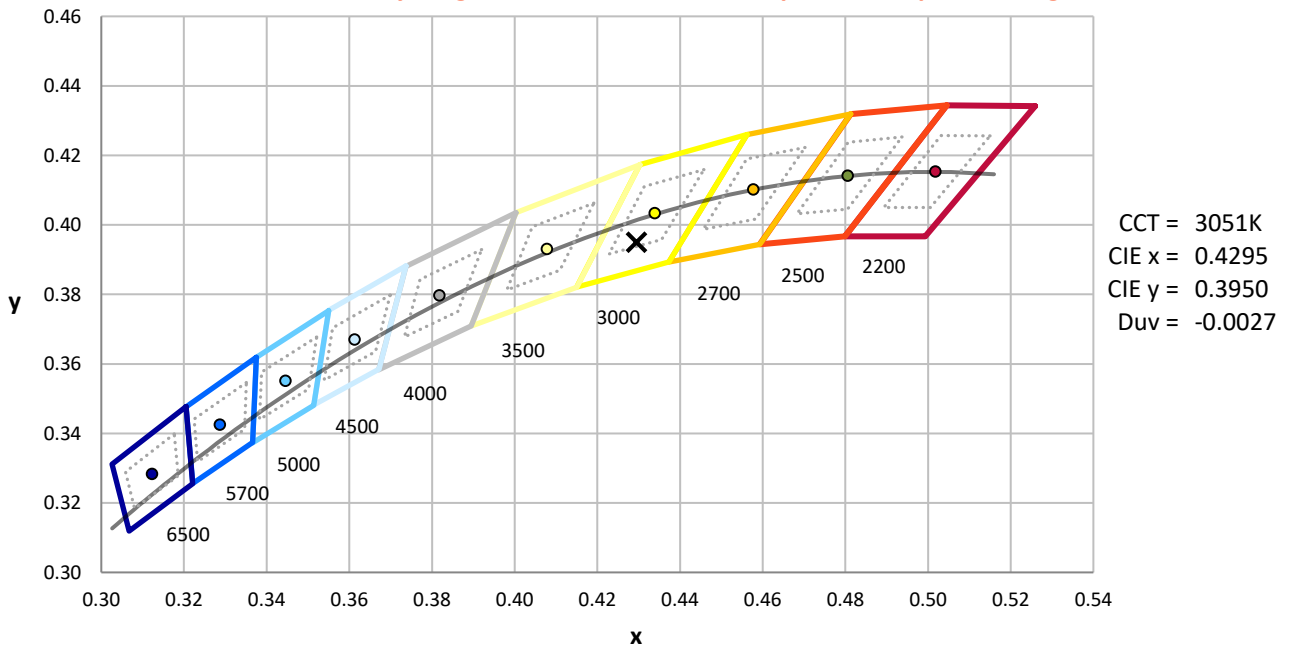
Measurement and Test Equipment			
Instrument	Identification Number	Calibration Date	Calibration Due Date
Photometer	76INCH SPHERE IN0058	2/9/2023	8/9/2023
Power Meter	XITRON 2801 IN0071	11/29/2022	11/29/2023
AC Power Source	CHROMA 61603 IN0063	11/28/2022	11/28/2023
DC Power Source	AGILENT E3634A IN0208	11/28/2022	11/28/2023
Sphere Thermometer	ONSET IN0085	11/28/2022	11/28/2023
Room Thermometer	ONSET IN0046	11/28/2022	11/28/2023

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CIE 1931 Chromaticity Diagram



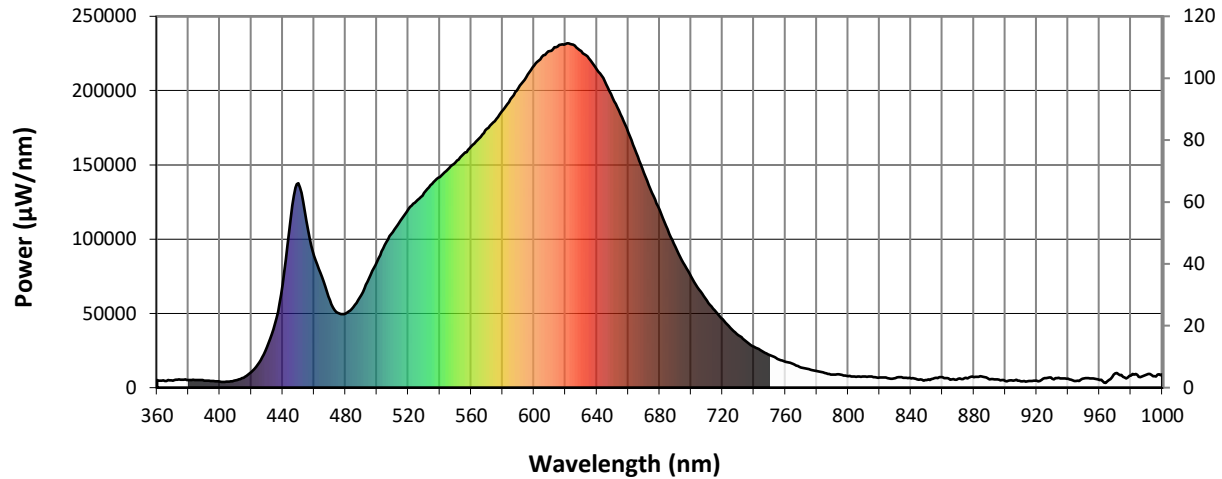
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 3000K 4-step quadrangle

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Photopic Flux vs. Wavelength

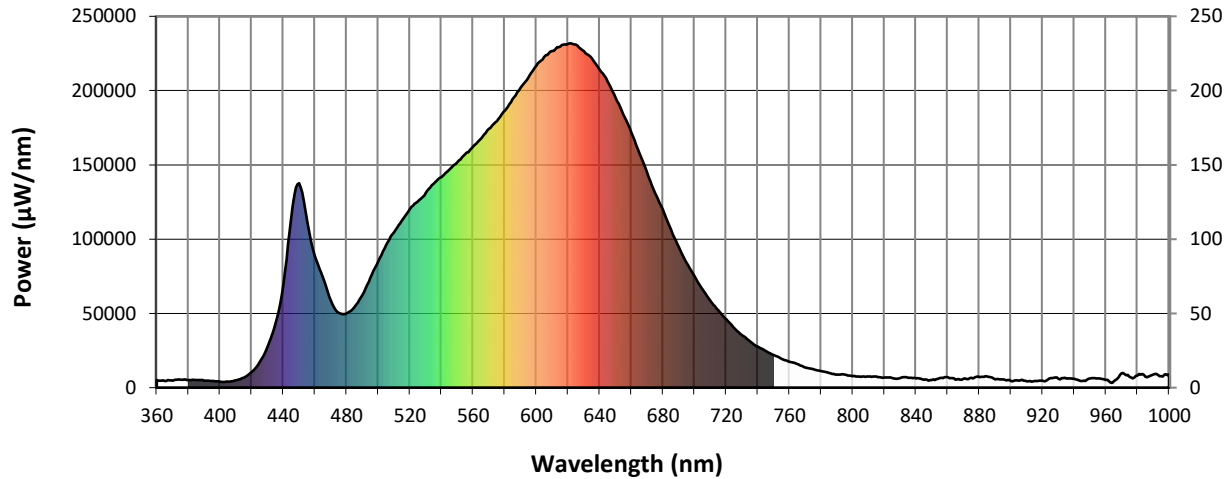


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λ (nm)	Power (μW/nm)	Lumens (φ/nm)	λ (nm)	Power (μW/nm)	Lumens (φ/nm)	λ (nm)	Power (μW/nm)	Lumens (φ/nm)	λ (nm)	Power (μW/nm)	Lumens (φ/nm)	λ (nm)	Power (μW/nm)	Lumens (φ/nm)
360	5142	NR	490	62439	NR	620	231386	NR	750	21976	NR	880	7157	NR
365	4540	NR	495	73651	NR	625	230941	NR	755	19435	NR	885	7445	NR
370	4803	NR	500	84837	NR	630	226625	NR	760	17457	NR	890	5651	NR
375	5429	NR	505	96138	NR	635	221573	NR	765	15928	NR	895	5663	NR
380	5059	NR	510	104675	NR	640	214183	NR	770	13612	NR	900	4391	NR
385	5164	NR	515	112374	NR	645	206197	NR	775	12383	NR	905	4718	NR
390	4787	NR	520	120074	NR	650	195149	NR	780	11099	NR	910	4205	NR
395	4429	NR	525	125393	NR	655	184048	NR	785	9818	NR	915	4466	NR
400	3966	NR	530	131080	NR	660	171890	NR	790	8853	NR	920	4608	NR
405	4026	NR	535	137166	NR	665	158117	NR	795	8815	NR	925	6506	NR
410	4947	NR	540	141770	NR	670	144601	NR	800	7747	NR	930	6091	NR
415	6735	NR	545	146789	NR	675	131155	NR	805	7317	NR	935	6242	NR
420	10542	NR	550	151664	NR	680	119765	NR	810	7417	NR	940	5908	NR
425	16995	NR	555	157152	NR	685	106544	NR	815	7400	NR	945	4377	NR
430	27239	NR	560	162379	NR	690	94952	NR	820	6832	NR	950	6170	NR
435	43016	NR	565	167867	NR	695	83928	NR	825	6514	NR	955	6143	NR
440	69527	NR	570	174214	NR	700	74959	NR	830	6419	NR	960	5227	NR
445	113795	NR	575	179459	NR	705	66186	NR	835	6702	NR	965	4363	NR
450	137556	NR	580	186493	NR	710	58632	NR	840	6224	NR	970	9654	NR
455	112457	NR	585	194218	NR	715	52023	NR	845	5410	NR	975	7378	NR
460	88709	NR	590	201759	NR	720	46022	NR	850	5183	NR	980	8170	NR
465	74548	NR	595	208902	NR	725	40235	NR	855	6469	NR	985	7350	NR
470	58681	NR	600	217002	NR	730	35330	NR	860	7161	NR	990	8712	NR
475	50369	NR	605	222691	NR	735	31141	NR	865	5351	NR	995	7670	NR
480	50005	NR	610	226497	NR	740	27444	NR	870	5943	NR	1000	8916	NR
485	54326	NR	615	229506	NR	745	24768	NR	875	6650	NR			

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Scotopic Flux vs. Wavelength



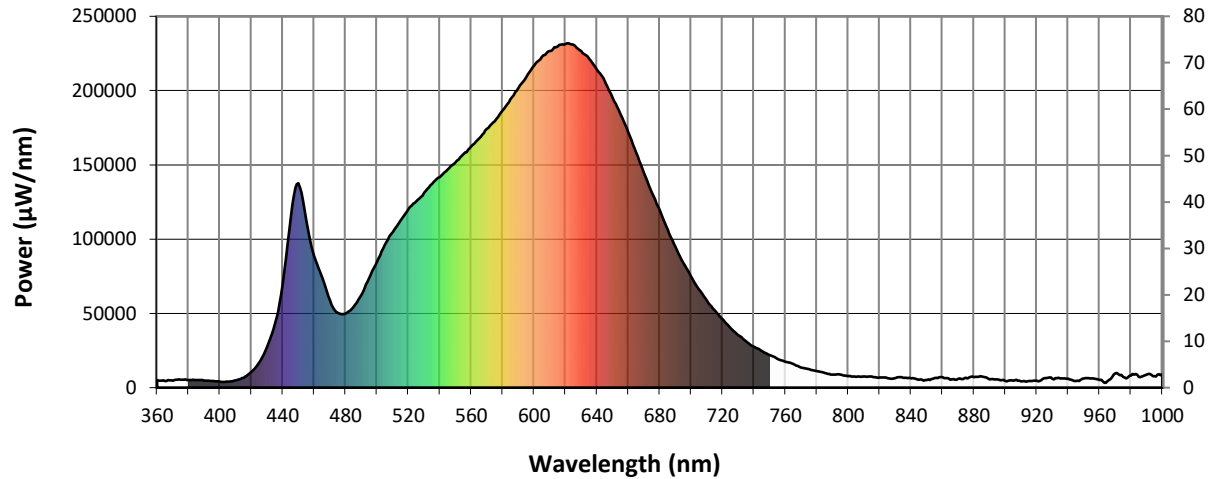
Scotopic Lumens: 16819.9

S/P: 1.43

λ (nm)	Power (μW/nm)	Lumens (Φ/nm)	λ (nm)	Power (μW/nm)	Lumens (Φ/nm)	λ (nm)	Power (μW/nm)	Lumens (Φ/nm)	λ (nm)	Power (μW/nm)	Lumens (Φ/nm)	λ (nm)	Power (μW/nm)	Lumens (Φ/nm)
360	5142	NR	490	62439	NR	620	231386	NR	750	21976	NR	880	7157	NR
365	4540	NR	495	73651	NR	625	230941	NR	755	19435	NR	885	7445	NR
370	4803	NR	500	84837	NR	630	226625	NR	760	17457	NR	890	5651	NR
375	5429	NR	505	96138	NR	635	221573	NR	765	15928	NR	895	5663	NR
380	5059	NR	510	104675	NR	640	214183	NR	770	13612	NR	900	4391	NR
385	5164	NR	515	112374	NR	645	206197	NR	775	12383	NR	905	4718	NR
390	4787	NR	520	120074	NR	650	195149	NR	780	11099	NR	910	4205	NR
395	4429	NR	525	125393	NR	655	184048	NR	785	9818	NR	915	4466	NR
400	3966	NR	530	131080	NR	660	171890	NR	790	8853	NR	920	4608	NR
405	4026	NR	535	137166	NR	665	158117	NR	795	8815	NR	925	6506	NR
410	4947	NR	540	141770	NR	670	144601	NR	800	7747	NR	930	6091	NR
415	6735	NR	545	146789	NR	675	131155	NR	805	7317	NR	935	6242	NR
420	10542	NR	550	151664	NR	680	119765	NR	810	7417	NR	940	5908	NR
425	16995	NR	555	157152	NR	685	106544	NR	815	7400	NR	945	4377	NR
430	27239	NR	560	162379	NR	690	94952	NR	820	6832	NR	950	6170	NR
435	43016	NR	565	167867	NR	695	83928	NR	825	6514	NR	955	6143	NR
440	69527	NR	570	174214	NR	700	74959	NR	830	6419	NR	960	5227	NR
445	113795	NR	575	179459	NR	705	66186	NR	835	6702	NR	965	4363	NR
450	137556	NR	580	186493	NR	710	58632	NR	840	6224	NR	970	9654	NR
455	112457	NR	585	194218	NR	715	52023	NR	845	5410	NR	975	7378	NR
460	88709	NR	590	201759	NR	720	46022	NR	850	5183	NR	980	8170	NR
465	74548	NR	595	208902	NR	725	40235	NR	855	6469	NR	985	7350	NR
470	58681	NR	600	217002	NR	730	35330	NR	860	7161	NR	990	8712	NR
475	50369	NR	605	222691	NR	735	31141	NR	865	5351	NR	995	7670	NR
480	50005	NR	610	226497	NR	740	27444	NR	870	5943	NR	1000	8916	NR
485	54326	NR	615	229506	NR	745	24768	NR	875	6650	NR			

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Melanopic Flux vs. Wavelength



Melanopic Lumens: 6505.3 M/P: 0.55

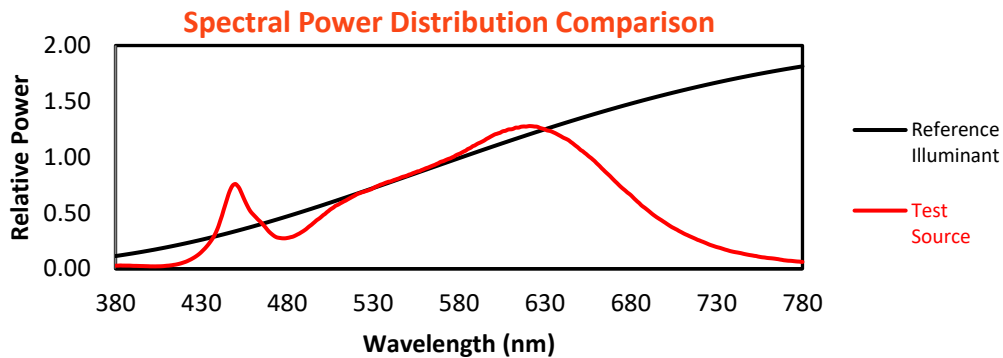
λ (nm)	Power (μW/nm)	Lumens (φ/nm)	λ (nm)	Power (μW/nm)	Lumens (φ/nm)	λ (nm)	Power (μW/nm)	Lumens (φ/nm)	λ (nm)	Power (μW/nm)	Lumens (φ/nm)	λ (nm)	Power (μW/nm)	Lumens (φ/nm)
360	5142	NR	490	62439	NR	620	231386	NR	750	21976	NR	880	7157	NR
365	4540	NR	495	73651	NR	625	230941	NR	755	19435	NR	885	7445	NR
370	4803	NR	500	84837	NR	630	226625	NR	760	17457	NR	890	5651	NR
375	5429	NR	505	96138	NR	635	221573	NR	765	15928	NR	895	5663	NR
380	5059	NR	510	104675	NR	640	214183	NR	770	13612	NR	900	4391	NR
385	5164	NR	515	112374	NR	645	206197	NR	775	12383	NR	905	4718	NR
390	4787	NR	520	120074	NR	650	195149	NR	780	11099	NR	910	4205	NR
395	4429	NR	525	125393	NR	655	184048	NR	785	9818	NR	915	4466	NR
400	3966	NR	530	131080	NR	660	171890	NR	790	8853	NR	920	4608	NR
405	4026	NR	535	137166	NR	665	158117	NR	795	8815	NR	925	6506	NR
410	4947	NR	540	141770	NR	670	144601	NR	800	7747	NR	930	6091	NR
415	6735	NR	545	146789	NR	675	131155	NR	805	7317	NR	935	6242	NR
420	10542	NR	550	151664	NR	680	119765	NR	810	7417	NR	940	5908	NR
425	16995	NR	555	157152	NR	685	106544	NR	815	7400	NR	945	4377	NR
430	27239	NR	560	162379	NR	690	94952	NR	820	6832	NR	950	6170	NR
435	43016	NR	565	167867	NR	695	83928	NR	825	6514	NR	955	6143	NR
440	69527	NR	570	174214	NR	700	74959	NR	830	6419	NR	960	5227	NR
445	113795	NR	575	179459	NR	705	66186	NR	835	6702	NR	965	4363	NR
450	137556	NR	580	186493	NR	710	58632	NR	840	6224	NR	970	9654	NR
455	112457	NR	585	194218	NR	715	52023	NR	845	5410	NR	975	7378	NR
460	88709	NR	590	201759	NR	720	46022	NR	850	5183	NR	980	8170	NR
465	74548	NR	595	208902	NR	725	40235	NR	855	6469	NR	985	7350	NR
470	58681	NR	600	217002	NR	730	35330	NR	860	7161	NR	990	8712	NR
475	50369	NR	605	222691	NR	735	31141	NR	865	5351	NR	995	7670	NR
480	50005	NR	610	226497	NR	740	27444	NR	870	5943	NR	1000	8916	NR
485	54326	NR	615	229506	NR	745	24768	NR	875	6650	NR			

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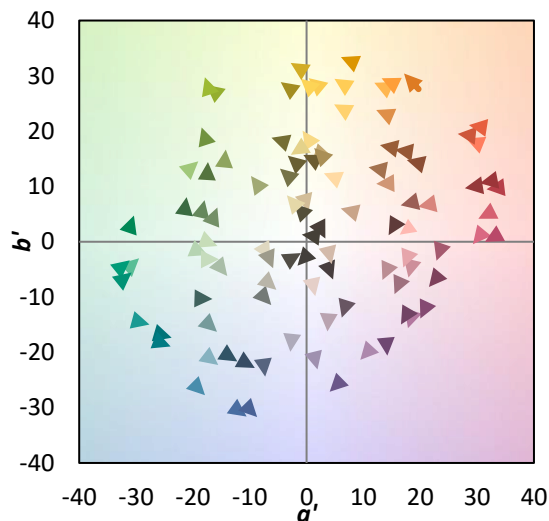
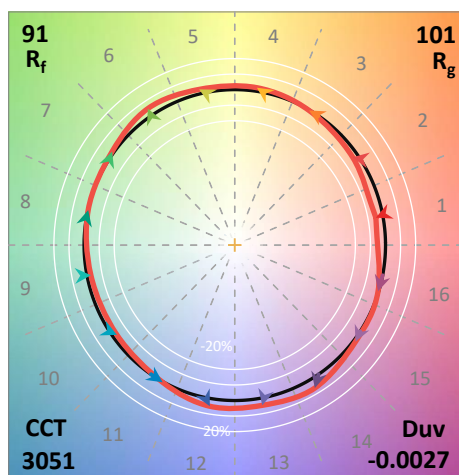
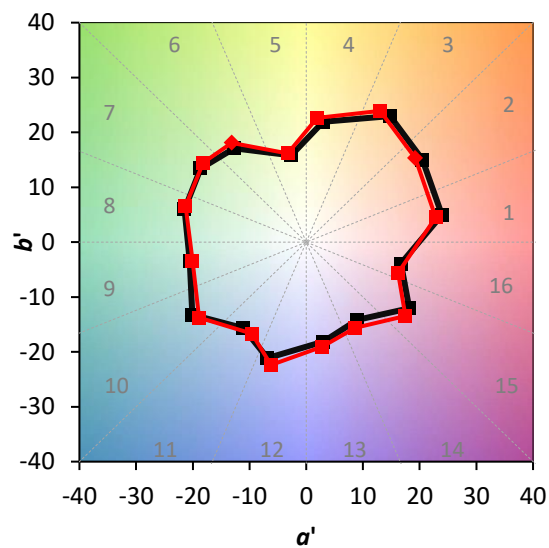
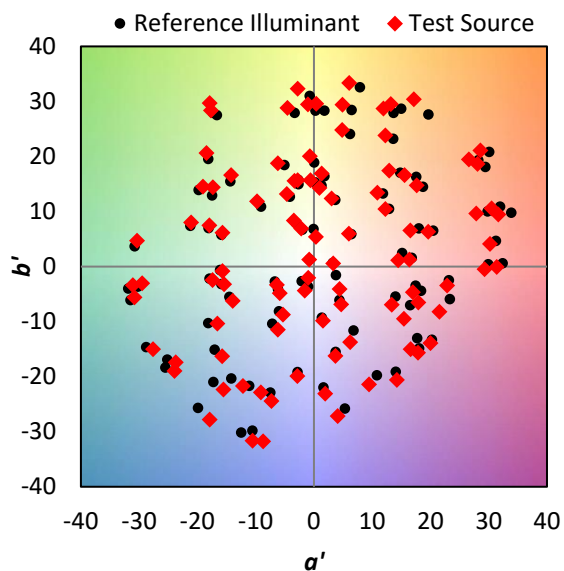
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Summary

$R_f = 90.7$
 $R_g = 101.5$
 CIE $R_a = 92.2$
 $R_9 = 60.2$



Color Vector Graphics

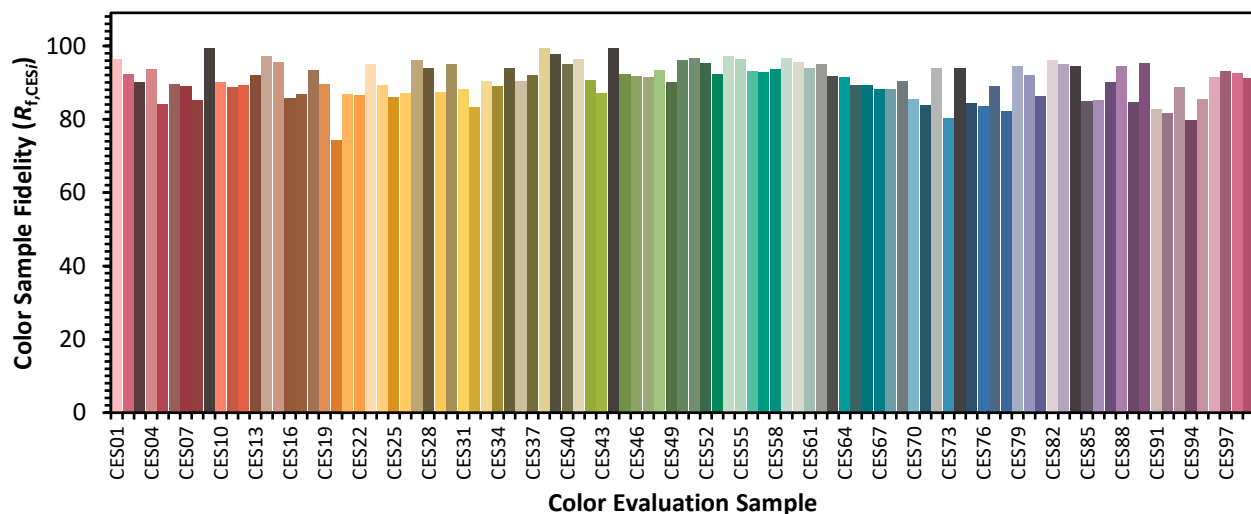


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Individual Sample Fidelity Index ($R_{f,i}$)

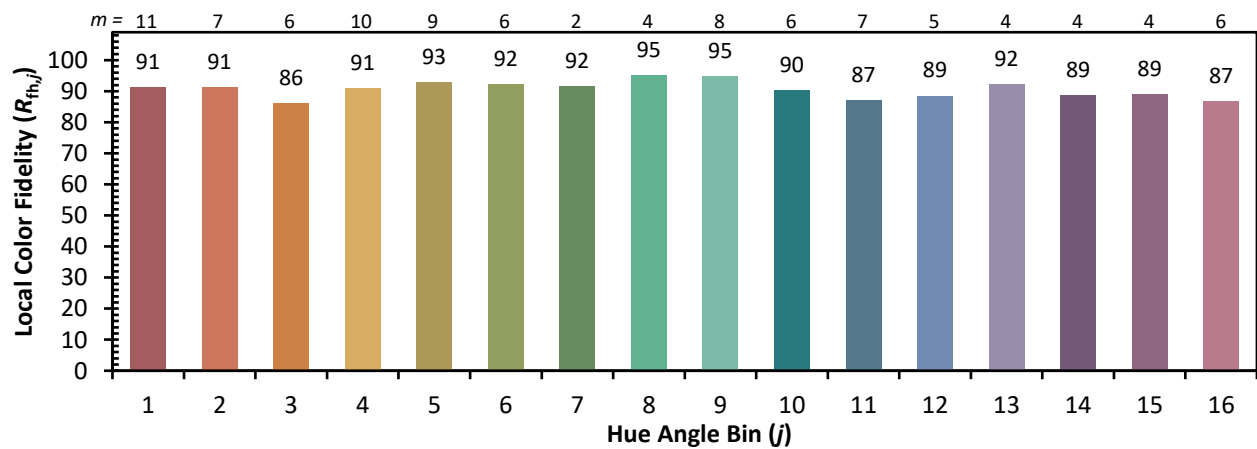
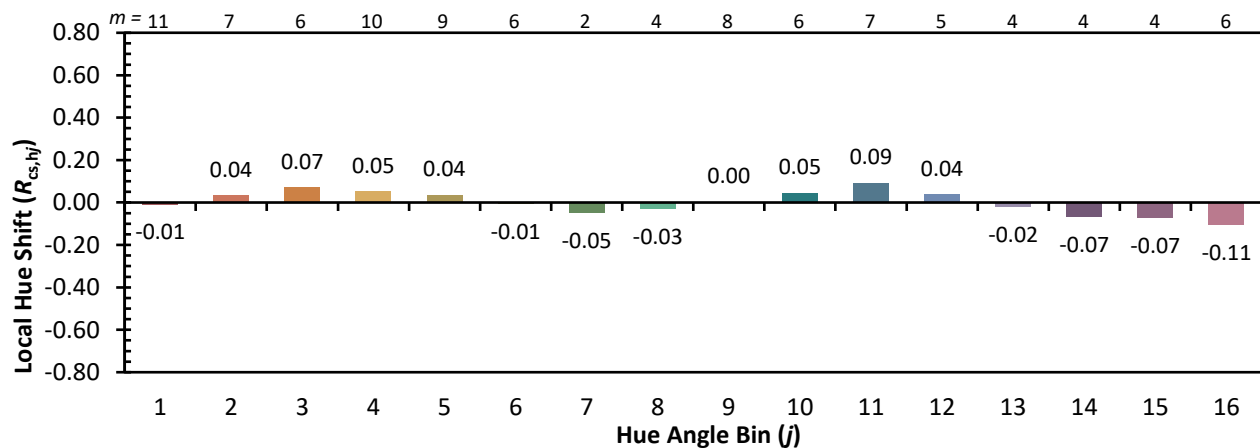
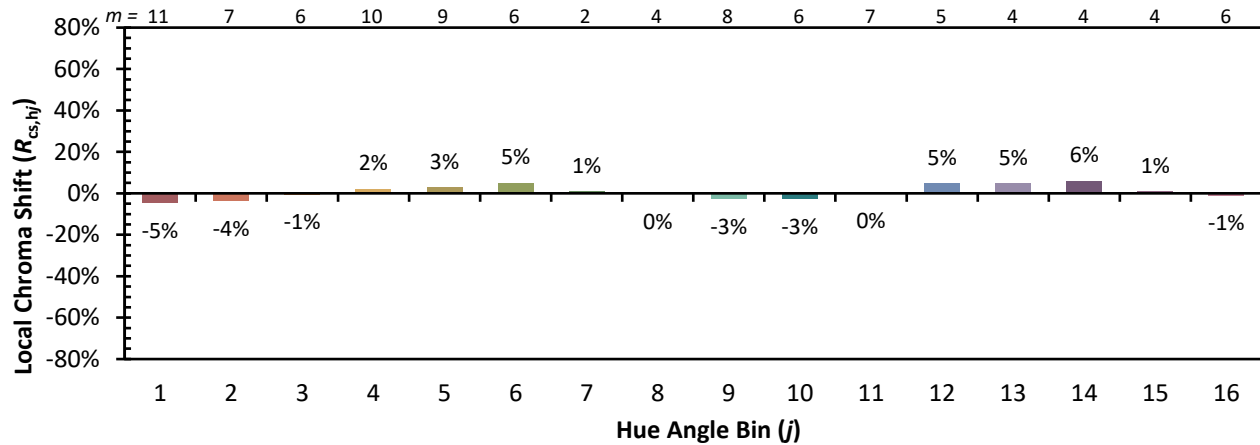
CES01 = 86	CES26 = 87	CES51 = 97	CES76 = 83
CES02 = 63	CES27 = 96	CES52 = 95	CES77 = 89
CES03 = 32	CES28 = 94	CES53 = 92	CES78 = 82
CES04 = 70	CES29 = 87	CES54 = 97	CES79 = 94
CES05 = 51	CES30 = 95	CES55 = 96	CES80 = 92
CES06 = 51	CES31 = 88	CES56 = 93	CES81 = 86
CES07 = 43	CES32 = 83	CES57 = 93	CES82 = 96
CES08 = 42	CES33 = 90	CES58 = 94	CES83 = 95
CES09 = 29	CES34 = 89	CES59 = 97	CES84 = 95
CES10 = 76	CES35 = 94	CES60 = 96	CES85 = 85
CES11 = 59	CES36 = 90	CES61 = 94	CES86 = 85
CES12 = 65	CES37 = 92	CES62 = 95	CES87 = 90
CES13 = 44	CES38 = 99	CES63 = 92	CES88 = 95
CES14 = 74	CES39 = 98	CES64 = 91	CES89 = 85
CES15 = 72	CES40 = 95	CES65 = 89	CES90 = 95
CES16 = 48	CES41 = 96	CES66 = 89	CES91 = 83
CES17 = 50	CES42 = 91	CES67 = 88	CES92 = 82
CES18 = 57	CES43 = 87	CES68 = 88	CES93 = 89
CES19 = 72	CES44 = 99	CES69 = 90	CES94 = 80
CES20 = 67	CES45 = 92	CES70 = 85	CES95 = 85
CES21 = 86	CES46 = 92	CES71 = 84	CES96 = 91
CES22 = 79	CES47 = 91	CES72 = 94	CES97 = 93
CES23 = 92	CES48 = 93	CES73 = 80	CES98 = 93
CES24 = 91	CES49 = 90	CES74 = 94	CES99 = 91
CES25 = 72	CES50 = 96	CES75 = 84	



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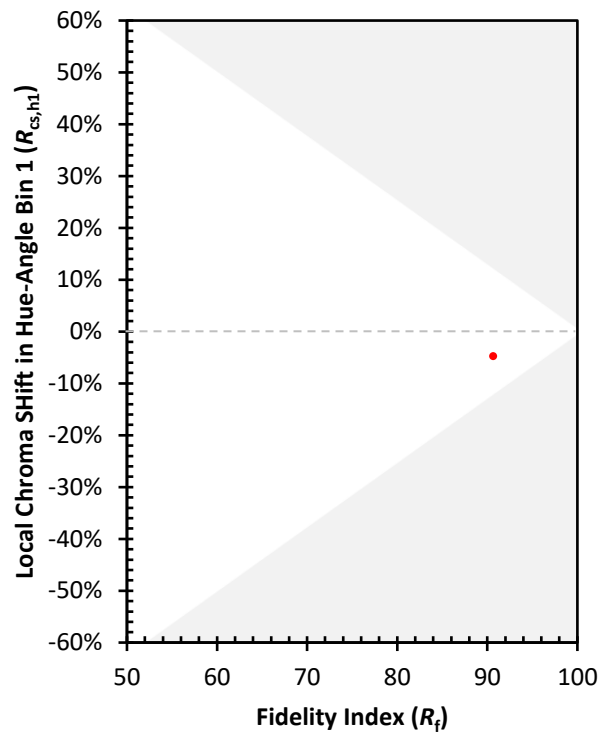
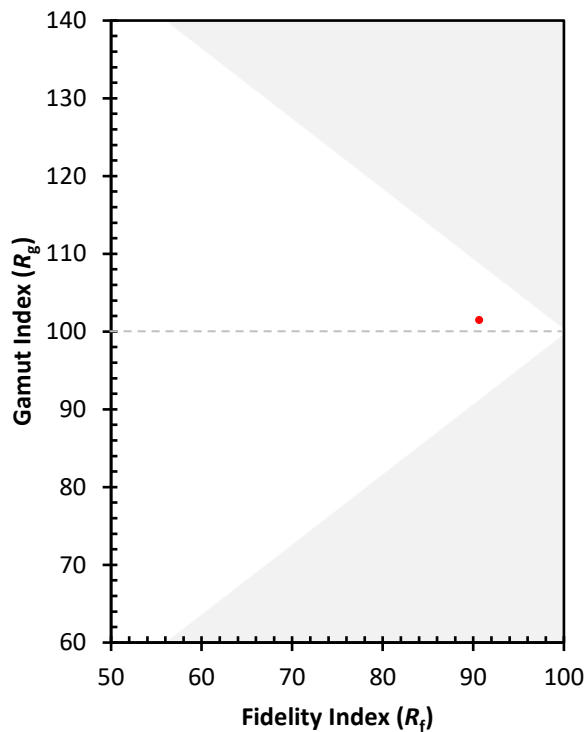
Color Rendition by Hue-Angle Bin



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Measure Comparisons



(END OF REPORT)